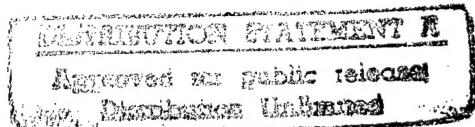


Basewide Energy Systems Plan

Executive Summary Final Report

Fort Gordon, Georgia



January 1983

Department of Defense

Prepared For
MOBILE DISTRICT CORPS OF ENGINEERS
MOBILE, ALABAMA
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EXECUTIVE SUMMARY

This is a summary of the results for Increments A, B, C, D, and E of the Basewide Energy Systems Plan for Fort Gordon, Georgia. (The results for Increments F and G are summarized on pages 5 through 7.) The plan includes analyses and recommendations of energy conservation projects for reduction of the installation's present energy consumption. The installation should be aware that savings figures presented in this summary can only be realized after all projects have been implemented. Black & Veatch has developed projects that would meet the funding requirements for the energy conservation program. Furthermore, the recommended projects provide partial compliance with the energy conservation requirements for the installation as outlined in the Army Facilities Energy Plan. This summary presents data on the following:

- Existing energy consumption
- Source energy reductions due to energy conservation techniques for buildings and their systems
- Application of solar energy to reduce fossil fuel consumption
- Savings utilizing central energy monitoring and control systems (EMCS)
- Use of solid waste as an alternate energy source
- Analysis of Total Energy/Selective Energy (TE/SE) systems

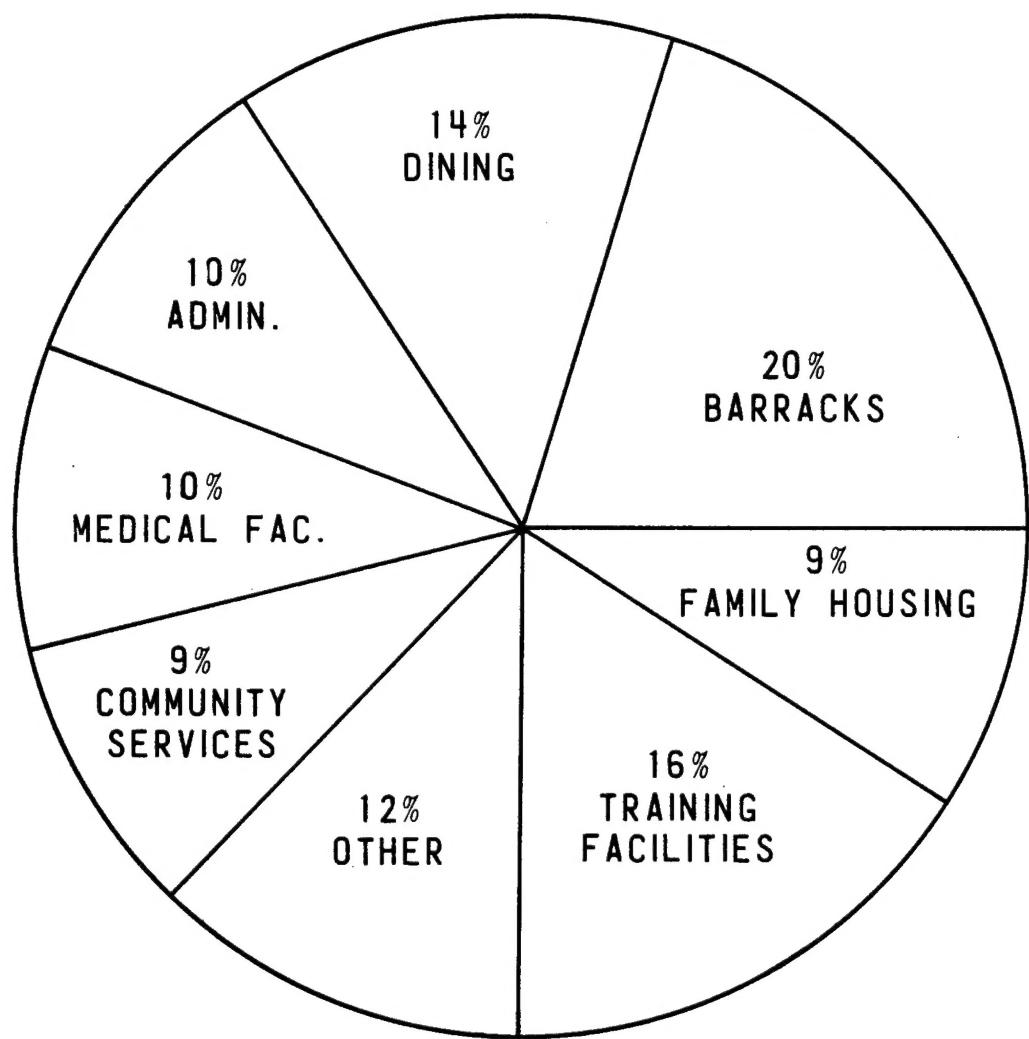
Tables 1 and 2 present information pertaining to the physical descriptions and energy consumption of 48 typical buildings used to verify historical energy consumption in the development of the basewide energy use model. This model was then utilized as the foundation for energy conservation project analyses and recommendations. Table 3 summarizes the daily personnel occupancy for each typical building. Tables 1, 2 and 3 also provide information which may be used to estimate source energy consumption for similar buildings within the designated groupings (see Appendix A for all tables referenced in this report). The estimated annual source energy consumption for all building types contributing to the basewide annual total of 2,547,806 mega-Btu, consumed during base year 1975, is shown on Figure 1.

Table 4 indicates the annual source energy consumed by each of the significant building groups used in our basewide energy mode. The model was within 10 percent of the historical source energy consumption for FY 1978 shown below.

Yearly Source Energy⁶
Consumption in Btu x 10⁶

1978

Electricity	1,089,310
Natural Gas	972,155
Propane Gas	85,858
Fuel Oil No. 2	419,154
Kerosene	14,340
 TOTAL	 2,580,817



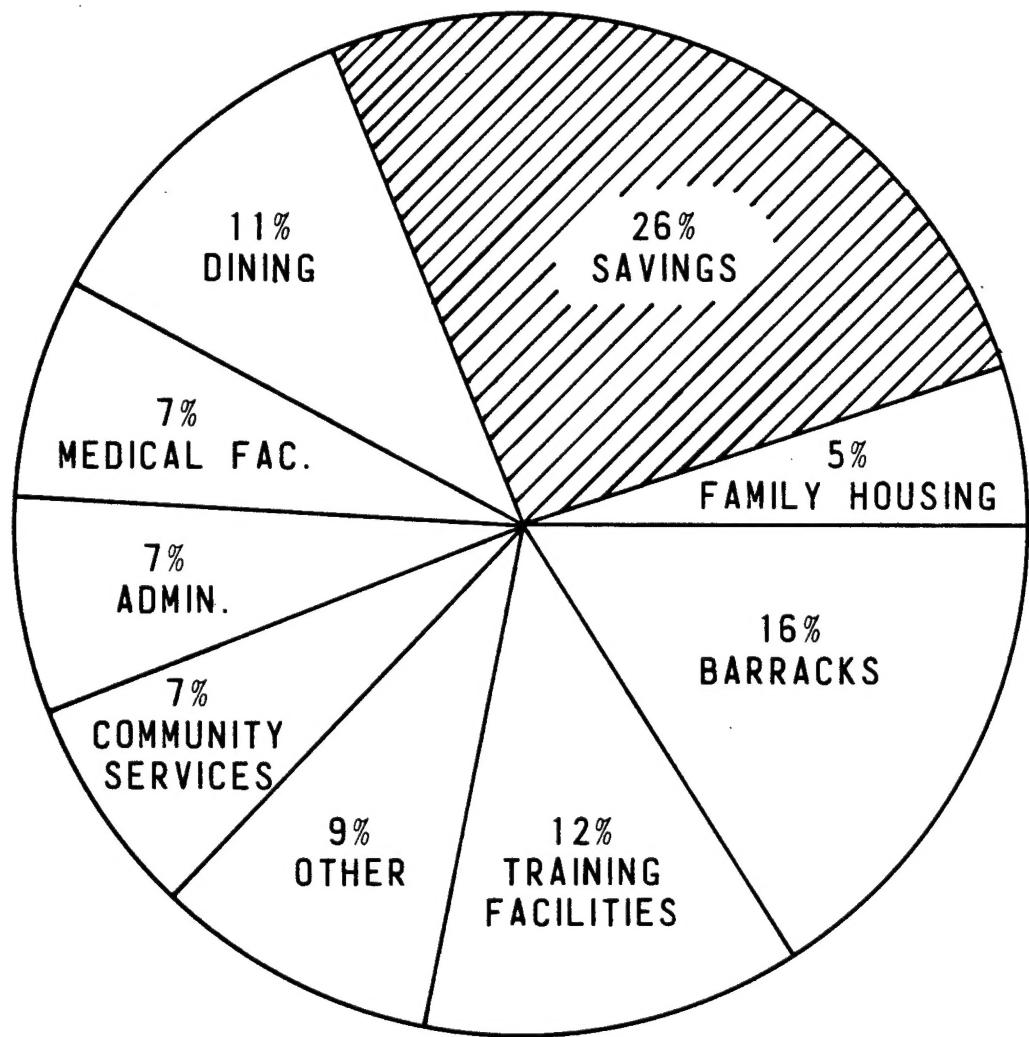
BASEWIDE CONSUMPTION FY'75

FIGURE 1

The total estimated source energy savings due to implementation of all feasible energy conservation projects developed within the scope of Increments A, B, C, D, and E of this study is 664,732 mega-Btu/year. These projects consisted of various architectural improvements, and mechanical and electrical system modifications.

Table 5 lists the project number, percent of basewide reduction, and the source energy savings for the indicated building types. Figure 2 illustrates the combined effect of the recommended energy saving improvements, as compared to the FY 1975 source energy expenditure. Our estimates indicate a savings of approximately 26 percent over the base year (1975). Figure 3 illustrates the relative percent reduction for significant building group comprising the 664,732 mega-Btu/year.

A detailed analysis of the projects listed in Table 5 is included in the following reports. Further explanation of the historical energy consumption, basewide energy model, and energy conservation analysis can be found in the Energy Use Survey. The reduction of Fort Gordon's dependence on nonrenewable energy sources by utilizing solar energy, a renewable energy source, indicates a total savings of 15,082 mega-Btu/year. Seven concepts were evaluated, which resulted in the Department of Energy selecting the roof-mounted solar ponds for the production of domestic hot water for barracks as a demonstration project. The seven concepts studied are presented in the Solar Energy Applications and Evaluations. The Energy Monitoring and Control Systems (EMCS) study includes recommendations for an extension of the existing system, and the utilization of an FM control system. An extension of



BASEWIDE CONSUMPTION AFTER ENERGY
CONSERVATION PROJECTS

FIGURE 2

ALLOCATION OF ENERGY CONSERVATION
PROJECTS SAVINGS

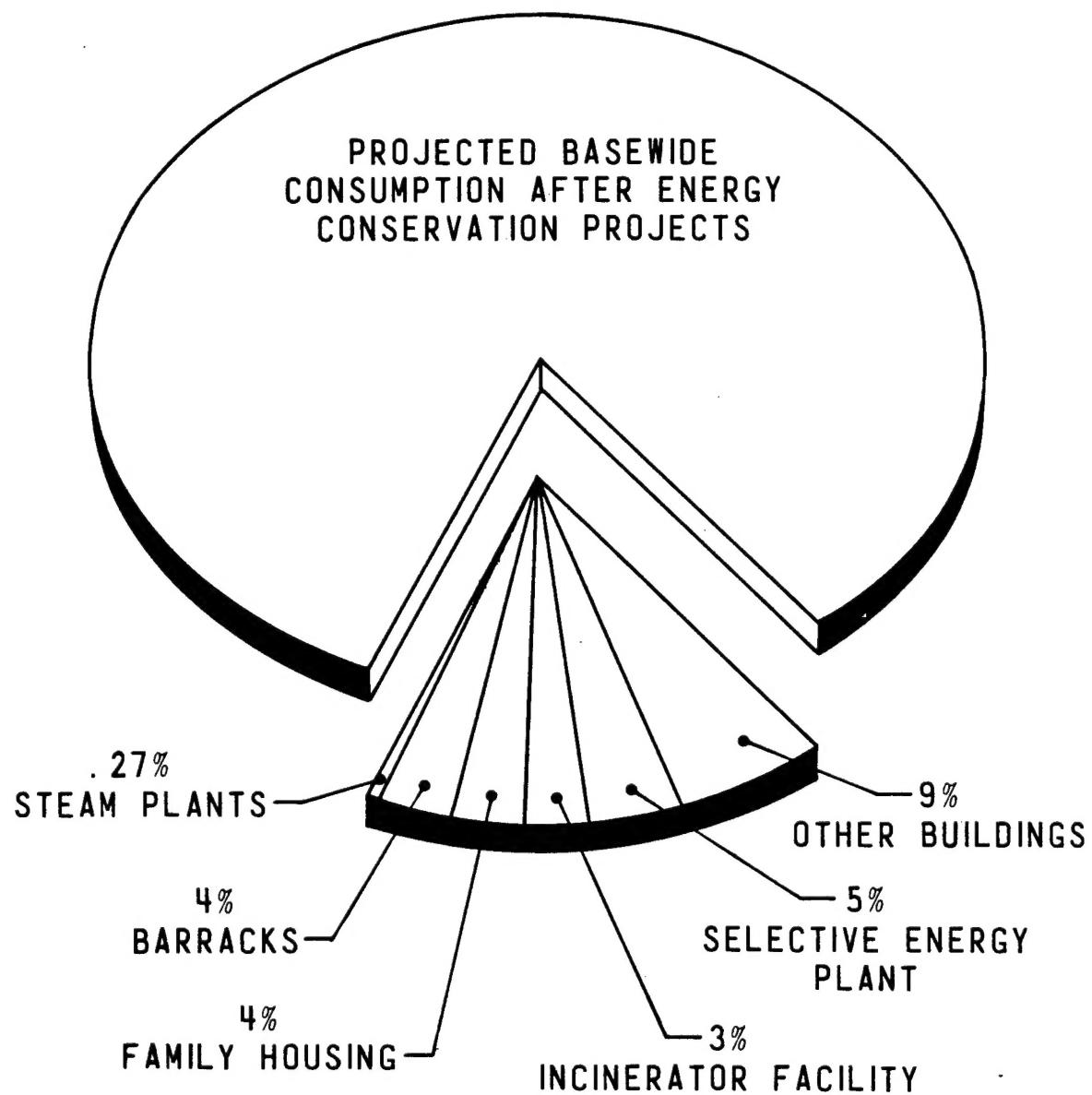


FIGURE 3

the existing system would result in a savings of 63,330 mega-Btu/year, while the FM control system would save 45,803 mega-Btu/year. The investigation of solid waste for reducing source energy consumption at Fort Gordon resulted in the development of Project No. 166, which recommends the installation of a solid waste-burning incinerator facility to provide steam to the existing steam distribution system. The proposed plant, to be located adjacent to existing Boiler Plant No. 25910, would provide reduction in both fuel oil and electric consumption totalling 108,150 mega-Btu/year. The details and descriptions of the systems analyzed can be found in the report entitled Total Energy, Selective Energy, and Central Boiler Plants.

The incorporation of a total energy system at this installation would not be recommended. However, a selective energy plant utilizing coal-fired boilers would reduce the basewide consumption of fuel oil and natural gas by 57 percent. This plant would be capable of generating 27 percent of the required electrical power at Fort Gordon. A 5 percent reduction in the basewide annual source energy consumption can be expected. Detailed descriptions of the TE/SE systems analyzed are included in the Total Energy, Selective Energy, and Central Boiler Plants report.

Table 6 was developed to give a prioritized schedule, in order of fiscal year, for implementing the recommended energy conservation projects.

EXECUTIVE SUMMARY-INCREMENTS F AND G

Increment F - Facilities Engineer Conservation Measures.
Increment G - Maintenance, Repair, and Minor Construction Projects.

This is a summary of the two phases of work that were started after the completion of Increments A, B, C, D, and E in May of 1980. Increments F and G were completed in November, 1982.

The purpose of Increment F of the Basewide Energy Systems Plan is to identify and develop recommendations that can be used by Fort Gordon in preparing its energy management plan. Included are a number of comparatively low cost projects, recommendations for training, and prioritized lists of possible energy conservation measures. Increment G identified maintenance, repair, and minor construction projects for the purpose of conserving energy. These are energy conservation projects that did not meet ECIP criteria or did not fit the ECIP program at the time that the remainder of the study was completed.

The average costs of energy for FY 1981 are given in Table 7. These costs have been used as the basis for determining the dollar savings per year.

Recommended projects developed within the scope of Increments F and G of the study are summarized in Tables 8 and 9 respectively. Projects are prioritized by their E/C ratio. The E/C ratio is defined as the ratio of yearly energy savings in million Btu to the cost estimate in thousands of dollars. Any project showing a payback of 15 years or less is recommended. Cost estimates are representative of April, 1981 prices.

At the request of Fort Gordon, five 1391's were prepared from projects developed under Increments F and G. These are:

- ✓ • High Temperature Water System Upgrade 86
- Hospital Area
 - EMCS Extension
 - Reduce Fluorescent Lighting *in hand*
 - Power Factor Improvement
 - Consolidation of Substations
 - Air to Air Heat Recovery
- Family Housing
 - Outlet and Switch Insulation
 - Reduce Infiltration
 - Toilet Tank Dams
- ✓ • Heating and Cooling 86
 - Automatic Chiller Condenser Tube Cleaning
 - Destratifiers
 - Variable Speed Pumping
 - Heat Recovery from Dust Collector
 - Boiler Fuel Conservation/Oxygen Trim Controls
- Facility Energy Improvements
 - Fluorescent Lighting Load Reduction
 - Insulating Solar Film
 - Window Insulating Panels
 - Flow Control Shower Heads
 - Indoor Pool Lighting Upgrade - Metal Halide

*100%
281P*

Figure 4 is a pie chart showing projected future energy savings due to ECIP projects developed under Increments A, B, C, D, and E and projects developed under Increments F and G.

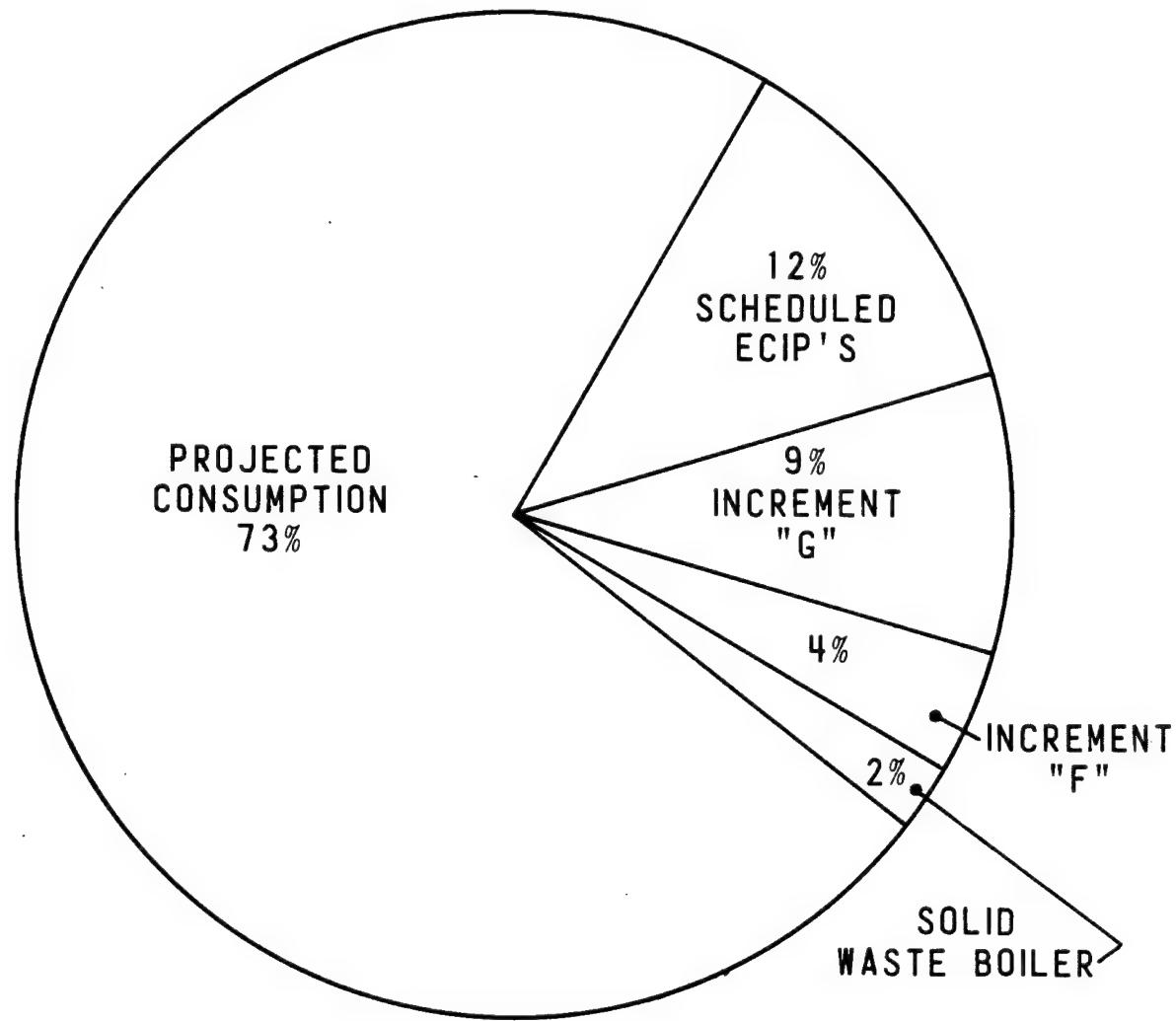
Figure 5 represents a forecast of Fort Gordon's future energy costs. The figure shows how costs could escalate if no energy conservation projects are implemented and what also could happen if all cost effective projects are implemented. The energy conservation projects would more than likely be implemented in three phases:

Phase I - ECIP.

Phase II - Increments F and G and Solid Waste Plant.

Phase III - Selective Energy Plant that would burn coal to produce all the steam requirements and part of the electrical requirements at Fort Gordon.

The curve shows a modest increase in FY87 due to new buildings. The large decrease shown in FY89 is primarily due to using coal, a cheaper fuel, in the Selective Energy Plant.



FORT GORDON
BASEWIDE CONSUMPTION FY '81
(2,671,215 MBTU)

FIGURE 4

EFFECT OF ESCALATION AND ENERGY
CONSERVATION ON FUEL COST

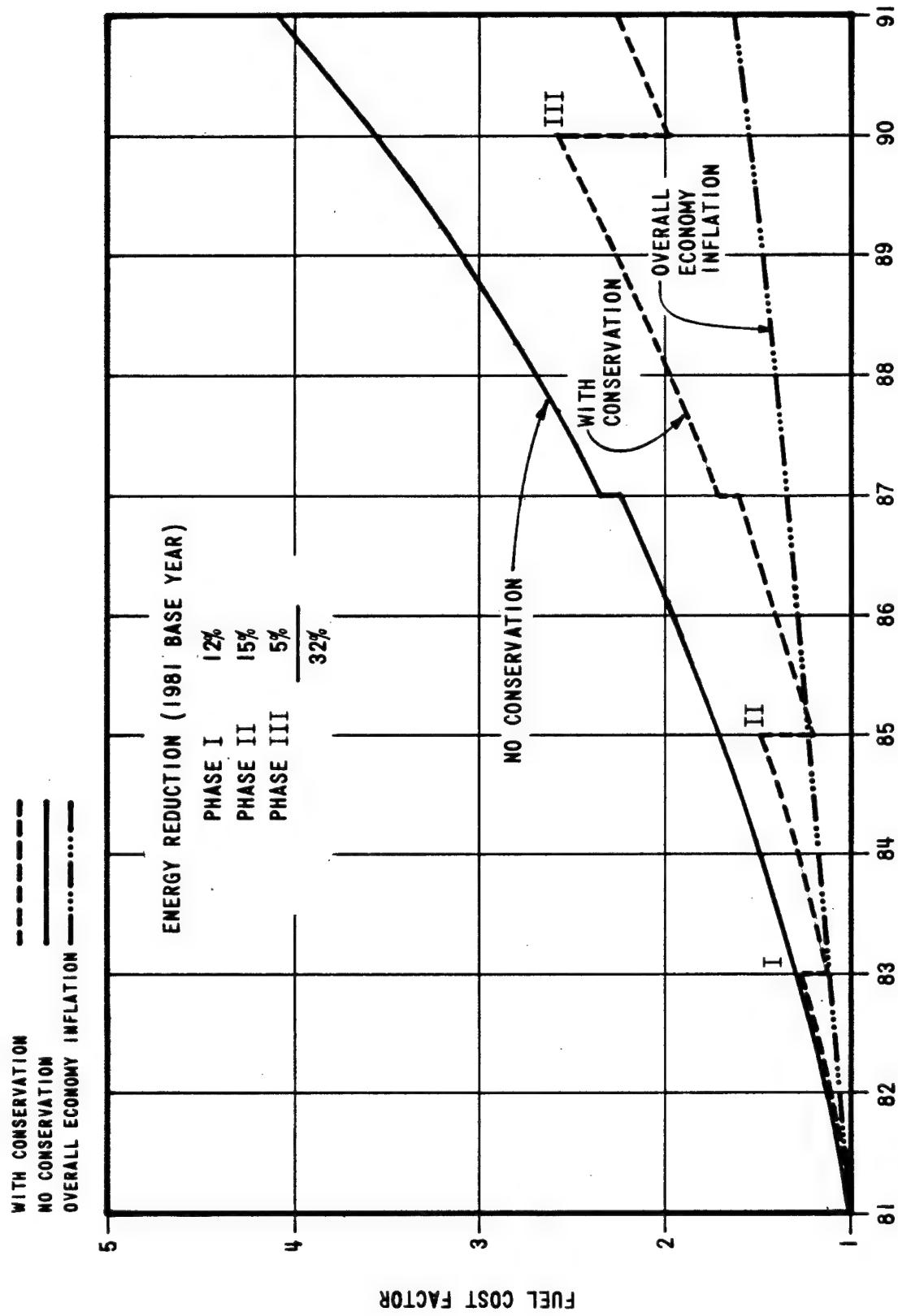


FIGURE 5

APPENDIX A

TABLES

TABLE I
TYPICAL BUILDING CONSTRUCTION DATA
FORT GORDON

GROUP NO.	BUILDING DESCRIPTION	NO. FLS	CONSTRUCTION				"U" VALUES				WINDOW SQ. FT.	AREA (FT. ²)	COOLING SYSTEM	HEATING SYSTEM	PEAK TRNS LOAD MH	DOMESTIC WATER CAP. (G)	CAP. FUEL			
			ROOF	WALL	FLOOR	WINDOW	DOOR	ROOF	WALL	FLOOR										
A-1	29706 ADMINISTRATION	1	BUILT-UP	BRICK & CONC. BLOCK	SLAB ON GRADE	SINGLE CLEAR GLASS	METAL	.18 .14	.29 .31	—	1.13 1.13	1.13 1.13	1.13 1.13	1.13 1.13	1.13 1.13	220.0 220.0	78 78	GAS		
A-2	16801 HEADQUARTERS BUILDING	1	COMPOSITE	CLAPBOARD ON WOOD FRAME	TILE, OPEN CRANL SPACE	SINGLE CLEAR GLASS	SOLID CORE	.05	.24	.54	1.13 1.13	.47	.47	.47	.47	119.9 119.9	30	ELEC		
A-3	39007 HEADQUARTERS BUILDING	1	COMPOSITE	CLAPBOARD ON WOOD FRAME	SLAB ON GRADE CRANL SPACE	SINGLE CLEAR GLASS	SOLID CORE	.05	.51	—	1.13 1.13	.49	.47	.47	.47	119.9 119.9	30	ELEC		
A-4	19719 ADMINISTRATION	1	COMPOSITE	CLAPBOARD ON WOOD FRAME	TILE, ENCL. CRANL SPACE	SINGLE CLEAR GLASS	SOLID WORe	.26	.23	.53	1.13 1.13	.47	.47	.47	.47	97.9 97.9	—	—		
A-5	29808 SIGNAL TOWER	11	BUILT-UP	BRICK & BLOCK	SLAB ON GRADE	SINGLE CLEAR GLASS	METAL HOLLOW CORE	.09	.10	—	1.13 1.13	1.06 1.06	1.06 1.06	1.06 1.06	1.06 1.06	—	—	—		
B-1	39113 BARRACKS	1	METAL & METAL	CONC. BLOCK & METAL	SLAB ON GRADE	SINGLE CLEAR GLASS	METAL	.06	.5	.24	—	1.13 1.13	.55	.544	.6419	1000 1000	—	—		
B-2	29700 BARRACKS	8	BUILT-UP	BRICK	CONCRETE, BASEMENT	SINGLE CLEAR GLASS	METAL HOLLOW CORE	.10	.39	.54	1.13 1.13	1.06 1.06	1.06 1.06	1.06 1.06	1.06 1.06	—	—	82.0 82.0		
B-3	91601 BARRACKS	2	COMPOSITE	CLAPBOARD ON WOOD FRAME	TILE, OPEN CRANL SPACE	SINGLE CLEAR GLASS	SOLID CORE	.32	.24	.54	1.13 1.13	.89	.87	.87	.87	150 150	—	GAS		
B-4	29718 BARRACKS	3	BUILT-UP	BRICK & BLOCK	CRANL SPACE	SINGLE CLEAR GLASS	METAL HOLLOW CORE	.04	.29	.52	1.13 1.13	.55	.4868	.41501	1000 1000	—	—	75 75	GAS	
B-5	16701 BARRACKS	2	COMPOSITE	CLAPBOARD ON WOOD FRAME	TILE, OPEN CRANL SPACE	SINGLE CLEAR GLASS	SOLID CORE	.05	.36	.54	1.13 1.13	.89	.87	.87	.87	1000 1000	—	—		
CS-1	39504 CHAPEL	1	COMPOSITE	CLAPBOARD ON WOOD FRAME	TAG, ENCL. CRANL SPACE	SINGLE CLEAR GLASS	WOOD	.24	.26	.19	1.13 1.13	.89	.500	.9302	1000 1000	—	—	120.6 120.6	30 ELEC	
CS-3	39201 LAUNDROMAT	1	BUILT-UP	BRICK & CONC. BLOCK	SLAB ON GRADE	SINGLE CLEAR GLASS	METAL	.05	.55	—	1.13 1.13	.55	.462	.4105	1000 1000	—	—	111.0 111.0	70	GAS
CS-4	16802 DAY CARE CENTER	1	COMPOSITE	CLAPBOARD ON WOOD FRAME	TILE, OPEN CRANL SPACE	SINGLE CLEAR GLASS	WOOD	.04	.24	.53	1.13 1.13	.89	.360	.4352	1000 1000	—	—	128.1 128.1	85	GAS
CS-5	39203 YOUTH ACTIVITIES KARATE CLASS	1	COMPOSITE	CLAPBOARD ON WOOD FRAME	TILE, OPEN CRANL SPACE	SINGLE CLEAR GLASS	WOOD	.26	.23	.53	1.13 1.13	.89	.285	.3404	1000 1000	—	—	163.4 163.4	30 ELEC	
CS-6	39200 LIBRARY	1	BUILT-UP	BLOCK & STONE	SLAB ON GRADE	SINGLE CLEAR GLASS	METAL	.06	.12	—	1.13 1.13	.55	.771	.14712	1000 1000	—	—	59.3 59.3	207.2	GAS
CS-7	39407 TRAINING BUILDING	1	COMPOSITE	CLAPBOARD ON WOOD FRAME	TILE, OPEN CRANL SPACE	SINGLE CLEAR GLASS	SOLID CORE	.06	.25	.30	1.13 1.13	.89	.228	.3265	1000 1000	—	—	118.0 118.0	30 ELEC	
CS-8	39005 POST EXCHANGE 6	1	BUILT-UP	CONC. BLOCK	SLAB ON GRADE	SINGLE CLEAR GLASS	METAL	.06	.5	—	1.13 1.13	.55	.132	.3209	1000 1000	—	—	102.6 102.6	50	GAS
CS-9	39417 LIBRARY	1	COMPOSITE	CLAPBOARD ON WOOD FRAME	TILE, OPEN CRANL SPACE	SINGLE CLEAR GLASS	WOOD	.26	.23	.53	1.13 1.13	.89	.281	.2800	1000 1000	—	—	59.3 59.3	—	—
CS-10	40509 NAUSON THEATER	1	BUILT-UP	CLAPBOARD ON WOOD FRAME	SLAB ON GRADE CRANL SPACE	SINGLE CLEAR GLASS	WOOD	.2	.3	—	1.13 1.13	.89	.40	.13330	1000 1000	—	—	294.4 294.4	—	—
D-1	29722 MESS HALL	1	BUILT-UP	BRICK & CONC. BLOCK	SLAB ON GRADE	SINGLE CLEAR GLASS	METAL	.04	.25	—	1.13 1.13	.55	.15221	.13273	1000 1000	—	—	45.2 45.2	1000	HTW
D-2	39105 MESS HALL	1	COMPOSITE	CONC. BLOCK	SLAB ON GRADE	SINGLE CLEAR GLASS	WOOD	.11	.52	—	1.13 1.13	.89	.221	.4936	1000 1000	—	—	184.0 184.0	80	GAS
D-3	39408 MESS HALL	1	COMPOSITE	CLAPBOARD ON WOOD FRAME	TILE, OPEN CRANL SPACE	SINGLE CLEAR GLASS	WOOD	.05	.32	.46	1.13 1.13	.89	.566	.4050	1000 1000	—	—	164.8 164.8	80	GAS
FH-2	609 FAMILY HOUSING	1	COMPOSITE	BRICK & WOOD	SLAB ON GRADE	SINGLE CLEAR GLASS	WOOD	.08	.08	—	1.13 1.13	.89	.281	.1950	1000 1000	—	—	11.1 11.1	40.3	GAS
FH-3	750 FAMILY HOUSING	2	SHINGLE	WOOD SLEATHING	SLAB ON GRADE	SINGLE CLEAR GLASS	SOLID CORE	.07	.09	—	1.13 1.13	.89	.448	.3390	1000 1000	—	—	16.4 16.4	80	GAS
FH-4	1973 FAMILY HOUSING	1	SHINGLE	CONC. BLOCK	SLAB ON GRADE	SINGLE CLEAR GLASS	SOLID CORE	.07	.08	—	1.13 1.13	.89	.516	.2464	1000 1000	—	—	12.3 12.3	43.9	GAS
FH-5	2001 FAMILY HOUSING	1	SHINGLE	WOOD	SLAB ON GRADE	SINGLE CLEAR GLASS	SOLID CORE	.07	.06	—	1.13 1.13	.89	.306	.2627	1000 1000	—	—	11.1 11.1	44.2	GAS

TABLE I (CONT'D)
TYPICAL BUILDING CONSTRUCTION DATA
FORT GORDON

TABLE 2
TYPICAL BUILDING ENERGY CONSUMPTION DATA
FORT GORDON

GROUP NO.	BLDG.	BUILDING DESCRIPTION	ANNUAL ENERGY SOURCE CONSUMPTION BTUx10 ⁶			ELEC'L ENER. CONSUMPTION		BTU x 10 ³ FT ²
			FUEL	ELEC.	TOTAL	KW PEAK	KWH/YR	
A-1	29706	ADMINISTRATION	1382	478	1861	11	41170	153.4
A-2	18801	HEADQUARTERS BUILDING	568	417	985	8	36010	358.2
A-3	39007	HEADQUARTERS BUILDING	442	219	661	6	18840	217.4
A-4	19719	SUPPLY & ADMINISTRATION	472	188	660	5	16240	265.3
A-5	29808	SIGNAL TOWER	22195	26506	48701	1000	2285000	483.2
B-1	39113	BARRACKS	903	253	1156	7	21830	180.1
B-2	36700	BARRACKS	13646	19705	33351	795	1698700	222.5
B-3	91601	BARRACKS	1323	168	1491	4	14490	280.8
B-4	25718	BARRACKS	8527	1998	10255	30	17220	247.1
B-5	18701	BARRACKS	721	166	887	4	14280	167.0
CS-1	30504	CHAPEL	258	1238	1496	58	106840	453.1
CS-3	35201	LAUNDROMAT	658	3268	3926	132	281710	956.9
CS-4	35402	DAY CARE CENTER	470	758	1228	50	65310	282.2
CS-5	44503	YOUTH ACTIVITIES KARATE CLASS	593	58	651	5	4970	191.2
CS-6	33500	LIBRARY	949	5463	6412	168	470980	435.8
CS-7	34407	TRAINING BUILDING	532	487	1019	26	42010	312.1
CS-8	39005	POST EXCHANGE & WEIGHT ROOM	453	243	696	22	20960	216.9
CS-9	33417	LIBRARY	381	188	569	5	16240	237.1
CS-10	40504	THEATER	1505	1844	3349	132	15900	251.2
D-1	29722	MESS HALL	14234	6877	21111	105	592806	1590.5
D-2	39105	MESS HALL	3045	3549	6594	59	305940	1335.9
D-3	39408	MESS HALL	883	242	1125	6	20820	277.8
FH-2	609	FAMILY HOUSING	256	218	474	9	18760	243.1
FH-3	750	FAMILY HOUSING	382	365	747	11	31480	220.4
FH-4	1973	FAMILY HOUSING	305	271	576	8	23390	233.8
FH-5	2001	FAMILY HOUSING	247	284	531	10	24540	202.1

TABLE 2 (CONT'D)
TYPICAL BUILDING ENERGY CONSUMPTION DATA
FORT GORDON

TABLE 3
BUILDING OCCUPANCY
FORT GORDON

GROUP NO.	BLDG.	BUILDING DESCRIPTION	NOMINAL PEAK POPULATION	OCCUPANCY
A-1	29706	ADMINISTRATION	100	WEEKDAYS - 7:00 A.M. TO 4:30 P.M.
A-2	38801	HEADQUARTERS BUILDING	9	WEEKDAYS - 7:30 A.M. TO 4:15 P.M.
A-3	39007	HEADQUARTERS BUILDING	20	WEEKDAYS - 7:00 A.M. TO 6:00 P.M. SATURDAY - 6:00 A.M. TO 1:00 P.M.
A-4	19715	SUPPLY AND ADMINISTRATION	25	WEEKDAYS - 7:00 A.M. TO 5:20 P.M.
B-1	39113	BARRACKS	55	OPEN 24 HOURS
B-2	36700	BARRACKS	299	OPEN 24 HOURS
B-3	91603	BARRACKS	50	OPEN 24 HOURS
B-4	25718	BARRACKS	258	OPEN 24 HOURS
B-5	18701	BARRACKS	74	OPEN 24 HOURS
CS-1	30504	CHAPEL	200	WEEKDAYS - 7:00 A.M. TO 8:00 A.M. SUNDAY - 8:00 A.M. TO 12:30 P.M.
CS-3	35201	LAUNDROMAT	9	WEEKDAYS - 9:00 A.M. TO 6:00 P.M. SATURDAY - 1:00 P.M. TO 5:00 P.M.
CS-4	18502	DAY CARE CENTER	25	WEEKDAYS - 7:30 A.M. TO 5:30 P.M.
CS-5	44503	YOUTH ACTIVITIES KARATE CLASS	29	6:00 A.M. TO 8:30 P.M.
CS-6	33500	LIBRARY	450	WEEKDAYS - 12:00 P.M. TO 9:00 P.M. WEEKENDS - 1:00 P.M. TO 9:00 P.M.
CS-7	38407	TRAINING BUILDING	28	WEEKDAYS - 7:30 A.M. TO 9:00 P.M.
CS-8	39005	POST EXCHANGE & WEIGHT ROOM	6	6 DAYS A WEEK - 5:00 P.M. TO 9:00 P.M.
CS-9	33417	LIBRARY	7	7:30 A.M. TO 5:30 P.M.
CS-10	40504	THEATER	1000	WEEKDAYS - 6:30 P.M. TO 10:00 P.M. WEEKENDS - 1:00 P.M. TO 10:00 P.M.
D-1	29722	MESS HALL	750	7 DAYS A WEEK - 4:00 A.M. TO 8:00 P.M.
D-2	39105	MESS HALL	240	7 DAYS A WEEK - 4:00 A.M. TO 8:00 P.M.
D-3	39408	MESS HALL	160	7 DAYS A WEEK - 4:00 A.M. TO 8:00 P.M.
FH-2	609	FAMILY HOUSING	4	OPEN 24 HOURS
FH-3	750	FAMILY HOUSING	8	OPEN 24 HOURS
FH-4	1973	FAMILY HOUSING	4	OPEN 24 HOURS
FH-5	2001	FAMILY HOUSING	4	OPEN 24 HOURS
FH-6	1602	FAMILY HOUSING	8	OPEN 24 HOURS
LA-1	39706	SUPPLY	6	WEEKDAYS - 7:30 A.M. TO 4:00 P.M.
L-1	2200	LAUNDRY	62	WEEKDAYS - 7:30 A.M. TO 4:00 P.M.
MA-1	21805	MAINTENANCE SHOP	20	WEEKDAYS - 6:30 A.M. TO 4:30 P.M.
MA-2	24804	MAINTENANCE SHOP	25	WEEKDAYS - 8:00 A.M. TO 4:00 P.M.
M-1	296	MEDICAL CLINIC	19	WEEKDAYS - 6:30 A.M. TO 3:00 P.M.
H-3	300	HOSPITAL	2700	OPEN 24 HOURS
T-1	18717	TRAINING	44	WEEKDAYS - 7:30 A.M. TO 4:00 P.M.
T-2	25601	TRAINING	50	WEEKDAYS - 7:30 A.M. TO 4:00 P.M.
T-3	38702	NCO SCHOOL	40	WEEKDAYS - 7:00 A.M. TO 10:00 A.M.
T-4	19724	TRAINING	50	WEEKDAYS - 7:30 A.M. TO 4:00 P.M.
T-5	29809	SIGNAL SCHOOL	250	WEEKDAYS - 6:30 A.M. TO 4:00 P.M.

TABLE 3 (CONT'D)
BUILDING OCCUPANCY
FORT GORDON

TABLE 4
Building Group Source Energy Consumption

Group	Description	Group Sq. Ft.	Total Source Consumption Btu's x 10 ⁶
A	Administrative	992,195	272,204
B	Barracks	2,221,279	541,809
CS	Community Service	637,619	260,079
D	Dining	344,864	395,121
FH	Family Housing	1,238,711	259,033
L	Laundry	56,380	25,362
LA	Laboratory	31,247	7,115
M	Medical	726,887	290,077
MA	Maintenance	335,415	46,544
T	Training	1,335,994	431,950
U-1	Sewage Treatment	1,506	2,133
U-2	Water Treatment	10,143	44,887
U-3	Pump Houses	1,400	14,700
U-4	Heating and Cooling Plants	20,474	6,496
W	Warehouses	657,455	63,794
Z	Electric Only		116,145

ENERGY CONSERVATION PROJECTS
SOURCE ENERGY SAVINGS

BUILDING TYPE	ENERGY SAVINGS BTUx1,000,000	% BASEWIDE REDUCTION FY'75	PROJECT NUMBER
FAMILY HOUSING	38,701 16,713 38,387 <hr/> 93,801	1.52 .66 1.51 <hr/> 3.69	T-2400 T-160 T-162
BARRACKS	9,218 41,503 17,641 15,810 15,082 10,876 <hr/> 110,130	.36 1.63 .69 .62 .59 .43 <hr/> 4.32	T-2300 T-2500 T-2600 T-161 T-167 T-168
INCINERATOR FACILITY	108,150	4.24	T-166
STEAM PLANTS	6,853	.27	T-165
SELECTIVE ENERGY PLANT	133,000	5.22	
OTHER BUILDINGS AFFECTED BY ECIP'S	13,825 68,327 29,090 20,651 28,451 52,454 <hr/> 212,798	.54 2.68 1.14 .81 1.12 2.06 <hr/> 8.35	T-2300 T-2600 T-160 T-161 T-169 T-168
TOTAL	664,732	26.09	

TABLE 5

ENERGY CONSERVATION PROJECTS DEVELOPED SCHEDULE - FT. GORDON, GEORGIA

PROJECT TITLE	PROJECT NUMBER	RECOMMENDED FISCAL YEAR	COST \$ x 1000	E/C RATIO	ENERGY SAVINGS BTUx1,000,000	YEARS PAYBACK	B/C RATIO
RELAMPING FLUORESCENT FIXTURES	T-2300	1980	287	80.3	23,043	2.5	3.27
STORM WINDOWS, WEATHERSTRIP DOORS AND KITCHEN LIGHTING FIXTURES IN FAMILY HOUSING	T-2400	1980	1041	39.2	38,701	9.1	1.96
INSULATED PANELS, STORM WINDOWS, AND WEATHERSTRIP DOORS IN PERMANENT BARRACKS	T-2500	1980	1176	35.3	41,503	9.4	2.00
INSULATION, WEATHERSTRIPPING, AND STORM WINDOWS IN TEMPORARY BUILDINGS	T-2600	1980	1670	51.5	85,968	4.0	2.17
TOTAL			4174		189,215		
FM RADIO CONTROL SYSTEM	T-160	1981	582	78.6	45,803	2.4	5.33
ADJUST FRESH AIR QUANTITIES	T-161	1981	246	148.3	36,461	1.8	9.95
FAMILY	T-162	1981	851	47.5	38,387	8.9	2.22
STEAM PLANT MODIFICATIONS	T-165	1981	248	27.7	6,853	13.6	1.60
SOLID WASTE BURNING INCINERATOR FACILITY	T-166	1981	3422	31.6	108,150	22.1	1.13
ROOF MOUNTED SOLAR PONDS FOR BARRACKS DOMESTIC HOT WATER (DOE DEMONSTRATION PROJECT)	T-167	1981	1223	12.3	15,082	14.0	1.36
TOTAL			6572		250,736		
UPGRADE MAINTENANCE FACILITIES	T-169	1982	442	64.3	28,451	3.5	5.38
EMCS EXTENSION	T-168	1982	586	108.0	63,330	2.2	5.62
TOTAL			1028		91,781		
SELECTIVE ENERGY PLANT		1983	26570	N/A	133,000	8.4	2.70
TOTAL			26570		133,000		

E/C = TOTAL ANNUAL ENERGY SAVINGS

COST (\$ x 1000)

B/C = TOTAL NON-RECURRING INITIAL CAPITAL COSTS

TABLE 6

TABLE 7
FY81 Average Energy Costs

Electricity	
Demand	\$4.41/kW
kWh (without demand)	\$0.0233/kWh
kWh (including demand)	\$0.0341/kWh
Natural Gas	
Demand	\$6.56/mcf
Commodity (without demand)	\$0.5068/mcf
Commodity (including demand)	\$3.29/mcf
Propane	
Commodity	\$0.603/gal
Fuel Oil	
No. 2	\$1.215/gal
No. 6	\$0.87/gal
Kerosene	\$1.22/gal

TABLE 8
Summary of Increment F Projects

Project	Location(s)	Energy Savings/Year MMBtu	Payback Years	Contract Cost			In-House Cost		Reference Pages
				B/C	E/C	Material	Manhours	Marr.	
Cycle Swimming Pool Pump	Building 21608	459	\$ 1,786	.1	225.0	2,716	\$ 75	Electrician 1	31 A178
Disconnect Condensing Unit in Winter	Family Housing (833 units)	2,899	11,277	.2	129.3	1,566	0	General 140	10 A5
Reduce Hot Water Temperature	Rolling Pin Barracks	663	5,091	.1	206	1,129	587	-	Laborer 27 28 A144
Turn Off Hot Water	Postwide	30,781	168,349	.2	111.8	854	36,053	0	Heat Shop 1,728 14 A44
Outlet and Switch Insulation	Family Housing (833 units)	11,137	46,375	.3	84.0	833	14,192	3,117	General 828 24 A103
Flow Control Shower Heads	52 Barracks	27,222	158,445	.2	118	795	34,384	21,038	Plumber 358 13 A32
Seal Building Wall	Building 19140	197	904	.4	81.6	592	333	50	Carpenter 12 Sheetmetal 48 41 A264
Reduce Hot Water Temperature	Mod Barracks	226	1,735	.2	99.7	546	414	-	Laborer 19 28 A144
Swimming Pool Cover	Building 21608'	1,369	6,284	.4	67.2	495	2,766	-	- 22 A80
Insulate Steam Pipe	Building 1301	582	2,670	.6	52.5	381	1,527	487	Insulator 35 43 A286
Insulate Steam Pipe	Building 19120	456	2,093	.6	46.7	339	1,345	404	Insulator 35 43 A286
Reduce Hot Water Temperature	Building 37300	5.3	25	.9	33.5	243	22	-	Laborer 1 28 A144

TABLE 8
Summary of Increment F Projects
(Continued)

Project	Location(s)	Energy Savings/Year MMBtu	Dollar Savings/Year	Payback Years	B/C	E/C	Contract Cost	In-House Cost Manhours	Reference Pages.
Reduce Hot Water Temperature	Brems Barracks	110	\$ 504	1.1	27.7	202	\$ 544	~	Laborer 25 28 A144
Cold Deck Reset (Surgery)	Building 300	261	948	1.4	15.3	198	\$ 1,317	\$ 859 Pipefilter 10	38 A243
Reduce Fluorescent Lighting	Building 300	5,393	19,588	1.4	16.4	192	28,078	10,326 Electrician 225	35 A215
Toilet Tank Inserts	Family Housing (833 units)	725	3,240	1.5	14.6	177	5,123	3,135 General 139	9 A1
Insulate Water Heaters	Building 3730	5.9	27	1.5	19.6	142	42	19 Laborer 1.0	26 A132
Reduce Infiltration in Family Housing	Family Housing (833)	22,974	95,164	2.0	12.6	122	188,646	62,162 Laborer 9330	23 A94
Insulate Water Heaters	Bldgs. 33200, 35202 and 33500	6.1	28	1.9	15.9	115	53	19 Laborer 1.5	26 A132
Cold Deck Reset (O.B.)	Building 300	133	483	2.7	7.8	101	1,317	\$ 859 Pipefilter 10	38 A243
Convert Incandescent Lighting to Fluorescent	12 Buildings	4,145	29,082	1.8	10.9	78	53,416	22,226 Electrician 530	32 A184
Boiler Shutdown	Building 35203	4,257	9,700	6.2	7.4	71	60,047	40,764 Pipefitter 650	45 A300
Heat Recovery From Dust Collector	Building 28320	90	415	3.3	9.2	67	1,350	1,029 Sheet Metal 8 Laborer 8	18 A54
Window Insulation	Bldgs. 25713 and 29607	586	2,473	4.3	6.0	55	10,685	4,516 Laborer 359	20 A61

TABLE 8
Summary of Increment F Projects
(Continued)

Project	Location(s)	Energy Savings/Year MMBtu	Dollar Savings/Year	Payback Years	Contract Cost E/C	In-House Cost Material	Reference Pages Narr. Calcs.
Air to Air Heat Recovery (0.B.)	Building 300	467	\$ 2,144	4.9	6.0	44 \$ 10,537	\$7,735 Plumber 8 Sheetmetal 64 42 A270
Solar Film for Signal Tower (West)	Building 29808	155.8	714	6.3	4.7	35 4,516	- - 11 A9
Solar Film for Signal Tower (East)	Building 29808	148.5	680	6.6	4.5	23 4,516	- - 11 A9
Air to Air Heat Recovery (Surgery)	Building 300	590	2,706	7.1	4.2	31 19,098	15,261 Plumber 8 42 A270
Window Insulation	Building 200	7.4	34	8.4	3.6	30 285	120 Laborer 10 20 A61
Storm Windows	Building 319	62.3	266	8.1	3.2	29 2,161	1,220 Laborer 40 40 A258
Window Insulation	Building 2401	78	356	8.4	3.6	26 2,991	1,264 Laborer 100 20 A61
Solar Film for Signal Tower (South)	Building 29808	113.4	545	8.3	3.6	25 4,516	- - 11 A9
Garage Door Weatherstripping	Building 2401	106	486	9.2	3.3	24 4,443	3,374 Laborer 64 37 A235
Reducing Flow Through Flush Valves	Per Unit	.34	1.30	12.0	3.6	22 16.0	5.00 Plumber .5 17 A50
Window Insulating Panels	10 Buildings	978	4,165	11.3	2.3	21 47,094	21,847 Laborer 1385 33 A204
Indoor Pool Lighting Upgrade - Building 21608 Metal Halide		528	7,025	3.5	4.0	21 24,828	11,621 Electrician 192 46 A312

TABLE 8
Summary of Increment F Projects
(Continued)

<u>Project</u>	<u>Location(s)</u>	<u>Energy Savings/Year</u>	<u>Dollar Savings/Year</u>	<u>Payback Years</u>	<u>B/C</u>	<u>E/C</u>	<u>Contract Cost</u>	<u>In-House Cost</u>	<u>Reference Pages</u>
		<u>MMBtu</u>	<u>\$</u>	<u>Years</u>			<u>Material</u>	<u>Manhours</u>	<u>Marr.</u>
Indoor Pool Lighting Upgrade - HPS	Building 21608	638	\$ 9,705	3.8	3.6	17 \$ 36,971	\$19,531	Electrician 192	30 A169
Fluorescent Ballast Replacement	Per Unit	0.4	1.5	17	1.2	15	26	18	- 36 A228
Solar Film for Signal Tower (North)	Building 29808	33.9	156	29	1.0	7.5	4,516	-	- 11 A9
Consolidation of Substations	Postwide	-	29,495	7.3	1.2	-	213,902	-	- 47 A326

TABLE 9
Summary of Increment G Projects

Project	Location(s)	Summary of Increment G Projects						Reference Pages
		Energy Savings/Year MMBtu	Dollar Savings/Year	Payback Years	B/C	E/C	Contract Cost	
Variable Speed Pumping (CW)	Bldg. 25910	29,665	\$ 115,396	.06	37.5	453	\$ 65,487	--
Boiler Fuel Conservation/ Oxygen Trim Control	Boiler Plants	28,420	143,068	.8	36.0	242	89,030	--
Automatic Chiller Condenser Tube Cleaning	Bldg. 25910	7,849	36,026	1.1	26.5	192	40,778	\$22,704
Automatic Chiller Condenser Tube Cleaning	Bldg. 301	4,286	19,673	1.4	21.3	154	27,779	15,466
Variable Speed Pumping (HTW)	Bldg. 25910	7,350	28,592	1.7	12.6	153	48,101	--
Automatic Chiller Condenser Tube Cleaning	Bldg. 25910	13,650	62,654	1.7	17.6	128	106,950	44,660
Automatic Chiller Condenser Tube Cleaning	Bldg. 25910	14,333	65,778	1.8	17.0	123	116,130	52,360
Automatic Chiller Condenser Tube Cleaning	Bldg. 25330	6,416	29,447	1.8	16.8	122	52,685	22,000
Desratifiers	5 Buildings	1,525	7,065	1.8	16.7	119	12,807	8,833
Automatic Chiller Condenser Tube Cleaning	Bldg. 301	4,436	\$ 20,363	2.1	14.5	105	\$ 42,121	\$17,589

Pipefitter 1252
Electrician 9
6 B16
-- 22 B167
-- 15 B99
Pipefitter 400
Electrician 5
6 B1
-- 15 B99
Pipefitter 1750
Electrician 13
6 B16
Pipefitter 2600
Electrician 18
6 B16
Pipefitter 971
Electrician 4
6 B23
Electrician 110
36 B201
Pipefitter 415
Electrician 7
6 B1

TABLE 9
(Continued)

Summary of Increment G Projects

Project	Location(s)	Energy Savings/Year		Payback Years	B/C	E/C	Contract Cost	Material	In-House Cost Manhours	Reference Pages
		Savings/Year	MMBtu							
Ceiling Fans	Building 1301	206		960	2.8	11.0	77	2,675	704	Electrician 44
Automatic Chiller Condenser Tube Cleaning	Bldg. 301	1,829		8,396	3.5	8.4	62	29,487	12,313	Pipefitter 815 Electrician 12
Fluorescent Lighting Load Reduction	Postwide	23,034		206,560	2.1	10.1	55	422,047	194,692	Electrician 3,384
EMCS Extension	6 Buildings	59,002		402,664	5.4	4.4	27	2,170,000	--	--
Heat Recovery From Mid-Sized Boilers	Postwide	328		1,506	9.4	3.2	23	14,112	--	--
Solid Waste Incinerator Plant	Adjacent to 25330	59,607		160,160	23.4	1.1	14.6	4,087,000	--	--
High Temperature Water Line Repair and Insulate	Distribution for Plant 25910	43,855		336,806	10.0	2.7	13.0	3,362,000	148,117	Pipefitter 51,000 Laborer 34,000
Infrared Heating	28 Buildings	5,482		25,164	20.5	1.4	10.6	516,675	197,976	Electrician 5,845
Burning of Waste Oil	Building 25910	499		2,533	22.1	1.9	8.9	56,074	--	--

B113

Narr. Calcs.

11

B75

6

B1

10

B51

17

B120

14

B87

21

B145

20

B134

9

B38

16

B113

TABLE 9
(Continued)

Summary of Increment G Projects

Project	Location(s)	Energy Savings/Year MMBtu	Dollar Savings/Year	Payback Years	B/C	E/C	Contract Cost	In-House Cost Manhours	Reference Pages
Power Factor Improvement	Substation	--	2,051	4.0	5.3	--	8,272	6,052	Electrician 53 18 B127
Power Factor Improvement	Hospital	--	\$ 2,051	23.3	.9	--	\$47,727	\$15,792	Electrician 476 34 B189

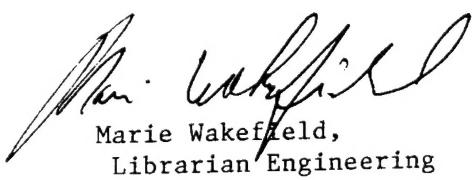


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